Title: Everything Comes Up Roses

Brief Overview:

The following series of activities introduce function tables, and apply the mathematical concept into a real-world situation. The students will have an opportunity to explore patterns within a function table, solve word problems, and make connections to the real-world. These activities allow students to enjoy mathematics creatively. Come see what Dr. Rosinbloom and staff have in store for your students.

Links to NCTM Standards:

- **Mathematics as Problem Solving**
  Students will demonstrate their ability to solve problems in mathematics including problems with open-ended answers and problems which are solved in a cooperative atmosphere.

- **Mathematics as Communication**
  Students will demonstrate their ability to communicate mathematically. They will read, write, and discuss mathematics with language and the signs, symbols, and terms of the discipline.

- **Mathematics as Reasoning**
  Students will demonstrate their ability to reason mathematically. They will make conjectures, gather evidence, and build arguments.

- **Mathematical Connections**
  Students will demonstrate their ability to connect mathematics topics within the discipline and with other disciplines.

- **Concepts of Whole Number Operations**
  Students will demonstrate their ability to describe and apply number relationships using concrete and abstract materials. They will choose appropriate operations and describe effects of operations on numbers.

- **Whole Number Computation**
  Students will demonstrate their ability to solve mathematical operations.

- **Patterns and Relationships**
  Students will demonstrate their ability to recognize numeric relationships and will generalize a relationship from data.

Grade/Level:

Grades 3-7

Duration/Length:

3 to 4 class sessions (variable)

Prerequisite Knowledge:

Students should have working knowledge of the following skills:

- Copying, continuing, and describing core patterns

- Building patterns when given a description
- Creating patterns
- Basic whole number operations

Objectives:

Students will:

- identify patterns in a function table.
- make function tables.
- recognize and identify rules for functions.
- solve word problems using a function table.
- apply their knowledge of functions to problem solving situations.
- write a persuasive letter.

Materials/Resources/Printed Materials:

- Unifix cubes
- Overhead projector and markers
- Student and teacher resource sheets
- Flower / plant literature (optional)
- Crayons / colored pencils (optional)

Development/Procedures:

Task 1 - Find The Rule

This is an activity in working with function tables. It uses a hands-on approach allowing students to manipulate materials to see how a function table is set up.

- Explain to students that we will be using a function machine and that function machines help us to gather data in an organized way in order to see a pattern.

- In order to provide students with a hands on introduction to function machines/tables, the teacher should provide each pair of students with at least 20 unifix cubes in two different colors. (One color per student).

- The teacher will write a number on the overhead. Ex. "5" The students should build the number using one color of cubes. Ex. 
- The teacher will write a second number. Ex.. "8" The student should add the second color of cubes until 8 cubes appear". Ex. 
- The teacher will ask students to explain what they had to do in order to get that second number. Ex. "add 3". 
- The teacher should explain that this same information can be represented in a table.

- Introduce the terms INPUT and OUTPUT. Explain that INPUT is the information that goes into the function machine and OUTPUT is the result of what happens inside the machine.

- Use the following tables to illustrate INPUT and OUTPUT.

- The teacher will ask the students to formulate a rule for each table. Discuss the rules thoroughly, and use other numbers to check the rule.
- Have students complete Student Resource Sheet 1A and 1B.

Optional Engagement Activities

In late spring, encourage a discussion of the student's observation of flowers.

Task 2 - Falling Petals

This is an activity using a real world example of using function tables.

- Read the activity prompt on Student Resource 2A and 2B as the students read along with you.
- Ask the students if there are any questions.
- Allow enough time for the students to complete the activity.

Task 3 - Color Garden

This is an activity which shows how to apply the function tables from the prior task.

- The students will be designing a rose garden based on the information gained from the function tables in Task 2.
- The students should be able to provide a written justification of their design; giving descriptive reasons to the placement and amount of each of the colored rose bushes.
- Give the student the activity and writing prompt given on Student Resource 3A and 3B.

Performance Assessment:

Task 1 - Follow The Rule
See Teacher Resource 1A and B

Task 2 - Falling Petals
See Teacher Resource 2A and B

Task 3 - Color Garden
See Teacher Resource 3

Extension/Follow Up:

Flower Petal Function Tables (Shows multiplication)
Use pattern block to create one flower with 6 petals and two flowers with 12 petals. How many petals will be on 10 flowers?

Florists
Give each colored flower a monetary value. How many flowers can you buy for $1.00, etc.

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NOTE: Student and Teacher Resource sheets are included on following pages.

Find The Rule

Directions (Part One): Use each function table below to identify the rule used in the table. Explain your answer in the space provided.

1.

INPUT	OUTPUT
2	4
3	5
4	6
5	7

Rule:

Convince Me:

2.

INPUT	OUTPUT
4	8
8	16
5	10
6	12

Rule:

Convince Me:

3.

INPUT	OUTPUT
10	5
12	7
15	10
30	25

Rule:

Convince Me:

Directons (Part 2): Use the rule to complete the function table.

4. Rule: Input + 3 = Output

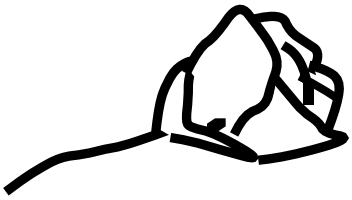
INPUT	OUTPUT
3	6
4	__
__	10
__	18

5. Rule: Input - 4 = Output

INPUT	OUTPUT
10	6
9	__
__	4
12	__
11	__

6. Rule: Input x 5 = Output

INPUT	OUTPUT
5	25
2	10
__	15
7	__
8	__



Falling Petals

Dr. Rosinbloom is a horticulturist, a person who studies the science and art of growing flowers. He lives in the town of Bloomington, where he discovered that the rose blossom loses a certain amount of its petals each day. Dr. Rosinbloom, of Roses 'R' Us, included the data in his article "Falling Petals." This article focused on three rose bush colors: yellow, pink, and red. You will make function tables of the total daily petal loss using information from Dr. Rosinbloom's article.

Yellow Rose Bush

"interval observations were recorded each day. During the first day, the yellow rose blossom lost two petals. On day two, I noted that a total of four petals had been lost. On day three, the yellow blossom had a total loss of six petals."

Day #	Total Petal Loss
1	2
2	4
3	6
4	
5	
6	
7	

Rule:

Convince Me:

How many days will it take for the yellow flower to lose all 36 petals?

Pink Rose Bush

"interval observations were recorded each day. During the first day, the pink rose blossom lost four petals. On day two, I noted that a total of eight petals had been lost. On day three, the pink blossom had a total loss of twelve petals."

Day #	Total Petal Loss
1	4
2	8
3	12
4	
5	
6	
7	

Rule:

Convince Me:

How many days will it take for the pink flower to lose all 36 petals?

Red Rose Bush

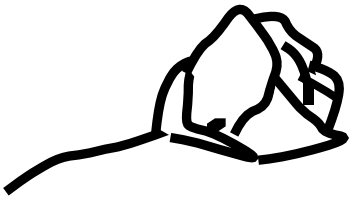
"interval observations were recorded each day. During the first day, the red rose blossom lost one petal. On day two, I noted that a total of three petals had been lost . On day three, the red blossom had a total loss of six petals. On day four, I noted that a total of ten petals had been lost."

Day #	Total Petal Loss
1	1
2	3
3	6
4	10
5	
6	
7	

Rule:

Convince Me:

How many days will it take for the red flower to lose all 36 petals?



Dr. Rosinbloom could not decide on how to best arrange the rosebushes. His wife Lily suggested that you and your classmates could create a garden which would produce to greatest amount of color over a thirty day period. So, Dr. Rosinbloom and the staff of Roses 'R' Us are having a contest for your class. The winner of the contest will receive a $500 cash prize.

The contest rules state you must include all of the following in your design:

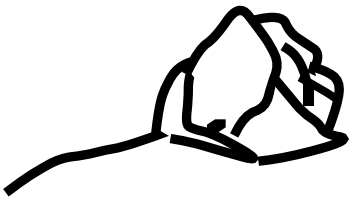
- Elements of a map (border, key, compass rose, author(s), and title)
- At least two of each color rose bush
- A total of ten rose bushes
- A building which represents Roses 'R' Us

On the space below, write a persuasive letter to Dr. Rosinbloom to justify your design is the best garden.

Be sure to include:

- Correct business letter format
- A position statement justifying your reason for choosing the color
- Combination of rose bushes
- Evidence from your data

Everything Comes Up Roses
Teacher Resource 1A



1.

INPUT	OUTPUT
2	4
3	5
4	6
5	7

Rule: Input + 2 = Output

Convince Me:

2.

INPUT	OUTPUT
4	8
8	16
5	10
6	12

Rule: Input x 2 = Output

Convince Me:

3.

INPUT	OUTPUT
10	5
12	7
15	10
30	25

Rule: Input - 5 = Output

Convince Me:

Directions (Part 2): Use the rule to complete the function table.

4. Rule: Input + 3 = Output

INPUT	OUTPUT
3	6
4	7
7	10
15	18

5. Rule: Input - 4 = Output

INPUT	OUTPUT
10	6
9	5
8	4
12	8
11	7

6. Rule: Input x 5 = Output

INPUT	OUTPUT
5	25
2	10
3	15
7	35
8	40

Falling Petals

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Yellow Rose Bush

"interval observations were recorded each day. During the first day, the yellow rose blossom lost two petals. On day two, I noted that a total of four petals had been lost . On day three, the yellow blossom had a total loss of six petals."

Day #	Total Petal Loss
1	2
2	4
3	6
4	8
5	10
6	12
7	14

Rule: Input x 2 = Output

Convince Me:

How many days will it take for the yellow flower to lose all 36 petals? **It will take 18 days.**

Pink Rose Bush

"interval observations were recorded each day. During the first day, the pink rose blossom lost four petals. On day two, I noted that a total of eight petals had been lost . On day three, the pink blossom had a total loss of twelve petals."

Day #	Total Petal Loss
1	4
2	8
3	12
4	16
5	20
6	24
7	28

Rule: **Input x 4 = Output**

Convince Me:

How many days will it take for the pink flower to lose all 36 petals?
It will take 9 days.

Red Rose Bush

"interval observations were recorded each day. During the first day, the red rose blossom lost one petal. On day two, I noted that a total of three petals had been lost . On day three, the red blossom had a total loss of six petals. On day four, I noted that a total of ten petals had been lost."

Day #	Total Petal Loss
1	1
2	3
3	6
4	10
5	15
6	21
7	28

Rule: **Increasing pattern**
Input + previous day = Output

Convince Me:

How many days will it take for the red flower to lose all 36 petals?
It will take 8 days.

Dr. Rosinbloom could not decide on how to best arrange the rosebushes. His wife Lily suggested that you and your classmates could create a garden which would produce the greatest amount of color over a thirty day period. So, Dr. Rosinbloom and the staff of Roses 'R' Us are having a contest for your class. The winner of the contest will receive a $500 cash prize.

The contest rules state you must include all of the following in your design:

- Elements of a map (border, key, compass rose, author(s), and title)
- At least two of each color rose bush (yellow, pink, red)
- A total of ten rose bushes
- A building which represents Roses 'R' Us

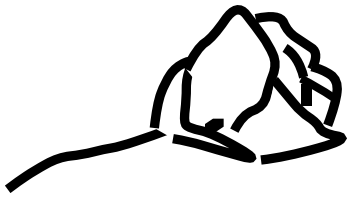
Scoring Tool

2 -- Includes all bulleted items
Shows creativity

1 -- Includes at least 2 bulleted items

0 -- Includes 1 bulleted item

NS -- Did not follow directions, not scorable



On the space below, write a persuasive letter to Dr. Rosinbloom to justify your design is the best garden.

Be sure to include:

- Correct business letter format
- A position statement justifying your reason for choosing the color
- Combination of rose bushes
- Evidence from your data

Scoring Tool

2 -- Includes all bulleted items
Correct spelling and grammar
Correct capitalization and punctuation

1 -- Includes 2 bulleted items
Few spelling and grammar errors
Few capitalization and punctuation errors

0 -- Includes 1 bulleted item
Lacks organization

NS -- Did not follow directions, not scorable